



2015 TPL Stability Scope

May 2015

Research, Development, and Special Studies

Revision History

Date or Version Number	Author	Change Description	Comments
11/14/2014	SPP Staff	Initial Draft	
12/30/2014	SPP Staff	Update based on the 12/22/2014 TPLTF meeting	
2/9/2014	SPP Staff	Stability wording edited.	
2/10/2015	SPP Staff	Update based on the February TPLTF meetings	
3/25/2015	SPP Staff	Revised and Updated	
4/24/2015	SPP Staff	Updated based on the April TPLTF meeting	
5/11/2015		TPLTF Approved	

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Overview

This document presents the scope and schedule of work for the NERC TPL-001-4 Stability Assessment. This scope document will be reviewed by the Transmission Planning Task Force (TPLTF), Transmission Working Group (TWG), and the applicable functional entities as described in NERC TPL-001-4. SPP, as the Planning Coordinator (PC¹), will coordinate with Transmission Planners (TP) to exchange data, review assessment results, and determine mitigation measures as required. SPP PSS/E modeling areas included in this assessment are shown in Table B. Areas adjacent to SPP for coordinated planning are shown in Tables C and D. The stability assessment is scheduled for completion by December 2015.

Data inputs

Modeling data

Modeling data required in the TPL Stability study is incorporated through the annual SPP MDWG model building process. The SPP MDWG model building process is performed in accordance with the applicable NERC Modeling, Data, and Analysis (MOD) Standards. In order to meet the R1 requirements, the models will represent the following:

- Existing Facilities
- Known outage(s) of generation or Transmission Facility(ies) with a duration of at least six months.
- New planned Facilities and changes to existing Facilities
- Real and reactive Load forecasts
- Known commitments for Firm Transmission Service and Interchange
- Resources (supply or demand side) required for Load

The model set in Table A below establishes category P0 as the normal System condition in TPL-001-4 Table 1, and defines the models that will be used for the 2015 TPL Stability analysis.

Description	Basecase	Sensitivity case (R2.4.3)
Year 1 peak	MDWG 2016S	ITPNT 2016S5
Year 1 off-peak	MDWG 2016L	ITPNT 2016L5
Year 10 peak	MDWG 2025S	N/A

Table A: Study Models

The generation dispatch in the basecase models is derived from a member submitted merit order block dispatch. The ITPNT Scenario 5 models, which were chosen for the sensitivity cases, have as much of the firm transmission rights protected as load allows. The wind machines are dispatched considerably higher in the ITPNT Scenario 5 models.

¹ In this document, SPP does not represent a TP.

Data required by PC

Initial Data Request

The initial data request focuses on collecting contingencies that will be used during the stability analysis performed by the PC.

The PC will provide the contingency naming convention for disturbances to be run in the Stability analysis. For contingencies requested for Stability analysis, the TP will provide the PC with data as per the PC's requested format (spreadsheet or PSA files), which will be provided to the TPs with the data request.

The list below summarizes the type of contingency data the PC expects to receive during the annual contingency request.

1. Member submitted contingencies
 - a. Planning events P1-P7
 - i. Events Expected to Produce More Severe Impacts (Includes events coordinated with adjacent systems)
 1. Rationale for Event Selections
 - ii. Relay models
 1. PSS/E Dynamic Relay Models for DYRE file and/or
 2. Description of time domain relay actions that replicate the expected removal of elements
 - iii. Description of successful and unsuccessful high speed (less than 1 second) reclosing
 - iv. Description of generator low voltage ride through characteristics if not already contained in DYRE file
 - b. Extreme events
 - i. Events Expected to Produce More Severe Impacts
 1. Rationale for Event Selections
 - ii. Relay models
 1. PSS/E Dynamic Relay Models for DYRE file and/or
 2. Description of time domain relay actions that replicate the removal of expected elements
 - iii. Description of successful and unsuccessful high speed (less than 1 second) reclosing into the fault
 - iv. Description of generator low voltage ride through characteristic if not already contained in DYRE file

Subsequent Data Request

The subsequent data requests will focus on collecting the Corrective Action Plans (CAPs) for system events exhibiting transient (rotor angle) instability, transient voltage response violations, machine damping violations, voltage stability violations, or Cascading. The PC may request additional data to support the assessment as needed. A Corrective Action Plan is a list of actions and an associated timetable for implementation to remedy a specific problem.

Stability Study

System Intact Analysis

Category 'P0' is considered system intact for the base and the sensitivity cases. The 'P0' analysis will consist of a 20 second no-fault and a 60 second ring-down simulation to test the integrity of the base and the sensitivity cases.

Contingency Analysis

V&R Energy's Fast Fault Scan (FFS) tool will be used for all category P1 and P2 events, and a selected set of category P3 and P6 events on the same bus for buses greater than 100kV to determine the more severe fault locations (buses) in the SPP region for each case. These locations will be ranked according to Critical Clearing times.

Stability analysis for disturbance events will be completed using Siemens PTI's PSS/E and PSSPLT.

Stability performance will be determined for two groups of events:

- Fast Fault Scan (FFS) events with critical clearing times less than 9 cycles
 - Prior to executing FFS event stability simulations in PSS/E, the PC will coordinate with members to determine the proper event description and time sequence of event actions and clearing times. The information will be provided to the PC in the format used for member-submitted contingencies.
- Member submitted events

During the stability simulations, monitored parameters will include

1. Rotor Angle and Speed
2. Real and Reactive Power
3. Bus voltages greater than 100kV in the disturbance Area(s). More than one area may be monitored depending on proximity to the disturbance.
4. Transient voltage response and machine rotor angle damping will be monitored and compared with the *SPP Disturbance Performance Requirements*.

Extreme events resulting in possible cascading will be identified and evaluated using V&R Energy's PCM (Potential Cascading Modes) tool.

Results

For planning events shown in TPL-001-4 Table 1, when the analysis indicates an inability of the System to meet the performance requirements in Table 1, the Planning Assessment shall include CAPs addressing how the performance requirements will be met.

Corrective Action Plan(s) do not need to be developed solely to meet the performance requirements for a single sensitivity case.

Study Areas

Area Number	Entity Name
520	American Electric Power (AEPW)
542	Board of Public Utilities (BPU)
546	City Utilities of Springfield, MO (SPRM)
523	Grand River Dam Authority (GRDA)
545	Independence Power & Light (INDN)
	ITC Great Plains, LLC (ITCGP)
541	Kansas City Power & Light Company (KCPL)
540	KCPL - Greater Missouri Operations (KCPL-GMO)
650	Lincoln Electric System (LES)
531	Midwest Energy, Inc (MIDW)
640	Nebraska Public Power District (NPPD)
524	Oklahoma Gas & Electric Company (OKGE)
527	Oklahoma Municipal Power Authority (OMPA)
645	Omaha Public Power District (OPPD)
515	Southwestern Power Administration (SWPA)
526	Southwestern Public Service Company (SPS)
534	Sunflower Electric Power Corporation (SECI)
544	The Empire District Electric Company (EDE)
652	Western Area Power Administration(WAPA)
536	Westar Energy, Inc. (WR)
525	Western Farmers Electric Cooperative (WFEC)

Table B: Assessment Areas

Assessment Distribution

Each Planning Coordinator and Transmission Planner shall distribute its Planning Assessment results to adjacent Planning Coordinators and adjacent Transmission Planners within 90 calendar days of completing its Planning Assessment, and to any functional entity that has a reliability related need and submits a written request for the information within 30 days of such a request.

If a recipient of the Planning Assessment results provides documented comments on the results, the respective Planning Coordinator or Transmission Planner shall provide a documented response to that recipient within 90 calendar days of receipt of those comments.

SPP Adjacent Transmission Planner	PSS/E Area Number	Contact email
Cleco Corporation	502	TBD
Entergy	351, 327	TBD
Ameren Services Company	356	eburkey@ameren.com
Saskatchewan Power Corporation	672	wguttormson@saskpower.com
Otter Tail Power Company	620	TBD
Minnkota Power Corporation	TBD	TBD
MidAmerican Energy Corporation	635	TBD
Great River Energy	615	TBD
City of Ames Electric Services	TBD	TBD
Central Iowa Power Cooperatives	TBD	TBD
Xcel Energy	600	TBD
Alliant Energy West	627	TBD
DPC	680	TBD
Montana-Dakota Utilities	661	TBD

Table C: Adjacent Transmission Planners

SPP Adjacent Planning Coordinator	Contact email
Associated Electric Cooperatives, Inc. (AECI)	tgott@aeci.org
Mid-Continent Area Power Pool (MAPP)	oa.elabbady@mappcor.org
Midcontinent Independent System Operator (MISO)	ehabibovic@misoenergy.org lhecker@misoenergy.org

Table D: Adjacent Planning Coordinators

Schedule

Owner	Scheduled Activities	Dates
PC	Contingency data request	May 15
TP	Deadline for providing Contingency Data	July 15
MDWG	2015 MDWG Dynamic model set approval	August 20
PC	Fast Fault Scans Complete	August 31
PC	Draft Stability Report Complete	November 10
PC	Stability Analysis Complete	December 1
PC	Final Stability Report Complete	December 3
TWG	TWG approval of Final Report	December 9

Changes in Process and Assumptions

In order to protect against changes in process and assumptions that could present a significant risk to the completion of the TPL study, any such changes must be vetted. If TWG votes on any process steps or assumptions to be used in the study, those assumptions will be used for the 2015 TPL study. Changes to process or assumptions recommended by stakeholders must be approved by the TWG. This process will allow for changes if they are deemed necessary and critical to the TPL study, while also ensuring that changes, and the risks and benefits of those changes, will be fully vetted and discussed.